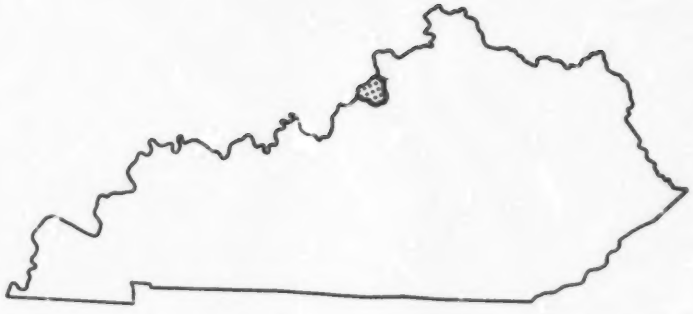
84
AUG 8 1987
594C-11
FEM 1.209:210185

FLOOD INSURANCE STUDY

OLDHAM COUNTY, KENTUCKY

UNINCORPORATED AREAS



COMPLETED

AUGUST 19, 1987

ORIGINAL

Federal Emergency Management Agency

COMMUNITY NUMBER - 210185

NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program (NFIP) have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study (FIS) may not contain all data available within the repository. It is advisable to contact the community repository for any additional data.

TABLE OF CONTENTS

		Page
1.0	INTRODUCTION	1
1.1	Purpose of Study	1
1.2	Authority and Acknowledgments	1
1.3	Coordination	1
2.0	AREA STUDIED	1
2.1	Scope of Study	1
2.2	Community Description	3
2.3	Principal Flood Problems	4
2.4	Flood Protection Measures	4
3.0	ENGINEERING METHODS	4
3.1	Hydrologic Analyses	9
3.2	Hydraulic Analyses	9
4.0	FLOODPLAIN MANAGEMENT APPLICATIONS	10
4.1	Floodplain Boundaries	10
4.2	Floodways	11
5.0	INSURANCE APPLICATION	14
6.0	FLOOD INSURANCE RATE MAP	14
7.0	OTHER STUDIES	15
8.0	LOCATION OF DATA	15
9.0	REFERENCES AND BIBLIOGRAPHY	15

TABLE OF CONTENTS (continued)

Page

FIGURES

Figure 1 - Vicinity Map 2

Figure 2 - The 100- and 500-year flood elevations of the Ohio River in front of residence at 2704 Belknap Drive 5

Figure 3 - At Oldham Acres Road bridge over Little Huckleberry Creek, the 100-year flood elevation of the Ohio River would be approximately 7 feet above top of rod 6

Figure 4 - On Riverside Drive, about 2,200 feet north of intersection of Riverside Drive and Oldham Acres Road, the 100-year flood elevation of the Ohio River would be approximately 3 feet above top of rod 6

Figure 5 - The 100- and 500-year flood elevations of the Ohio River at the intersection of Cardinal Harbour Drive and Lakewoods Court 7

Figure 6 - The 100- and 500-year flood elevations of the Ohio River at State Route 524 bridge over Covington Ridge Branch 7

Figure 7 - The 100-year flood elevations of the Ohio River at south bend in Old State Route 524 8

Figure 8 - Floodway Schematic 14

TABLES

Table 1 - Summary of Discharges 9

Table 2 - Floodway Data 12

EXHIBITS

Flood Profiles

Pages

Ohio River Panels 01P - 02P 19-20

Flood Insurance Rate Map Index
Flood Insurance Rate Map

Elevation Reference Marks

FLOOD INSURANCE STUDY

OLDHAM COUNTY,
UNINCORPORATED AREAS,
KENTUCKY

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the Unincorporated Areas of Oldham County, Kentucky, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood risk data for various areas of the community that will be used to establish actuarial flood insurance rates and assist the community in its efforts to promote sound floodplain management. Minimum floodplain management requirements for participation in the National Flood Insurance Program are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence and the state (or other jurisdictional agency) will be able to explain them.

1.2 Authority and Acknowledgments

The hydrologic and hydraulic analyses for this study were performed by the U.S. Army Corps of Engineers (COE), Louisville District (the Study Contractor) for the Federal Emergency Management Agency (FEMA), under Inter-Agency Agreement No. EMW-84-E-1506, Project Order No. 1, Amendment No. 13. This study was completed in June 1985.

1.3 Coordination

Streams requiring detailed study were identified at a meeting attended by representatives of the Study Contractor, FEMA, and the Commonwealth of Kentucky, Department of Natural Resources, Division of Water, in February 1984.

On September 25, 1986, the results of this Flood Insurance Study were reviewed and accepted at a final coordination meeting attended by representatives of the Study Contractor, FEMA, and the community.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the unincorporated areas of Oldham County, Kentucky. The area of study is shown on the Vicinity Map (Figure 1). The incorporated areas within the county were excluded from this study.

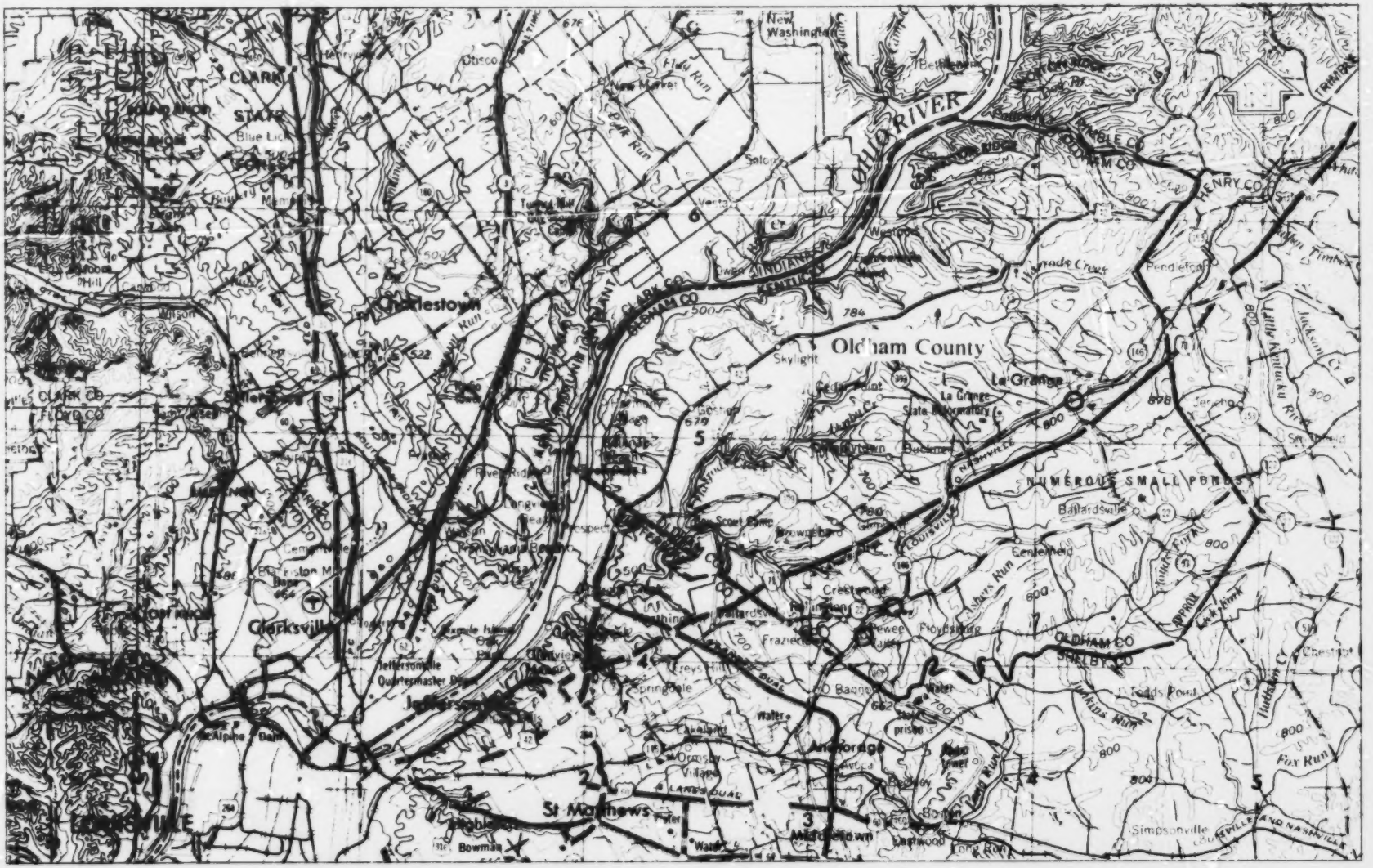


FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

OLDHAM COUNTY, KY

(UNINCORPORATED AREAS)

APPROXIMATE SCALE

4 0 4 8 12 MILES

VICINITY MAP

2

Flooding caused by overflow of the Ohio River within the county boundaries was studied in detail.

Approximate analyses were used to study those areas having a low development potential or minimal flood hazards.

Flooding caused by overflow of Pattons Creek, Organ Creek, Eighteen Mile Creek, Caney Fork, Sycamore Run, Garrett Branch, Pond Creek, Harrods Creek, South Fork Harrods Creek, Hite Creek, Sinking Fork, Danby Creek, South Fork Danby Creek, Danby Fork, Cedar Creek, North Fork Cedar Creek, Brush Creek, Ash Run, Floyds Fork, Currys Fork, Ashers Run, South Fork Currys Fork, North Fork Currys Fork, North Fork Floyds Fork, and East Fork Floyds Fork was studied by approximate methods within the community.

The areas studied were selected with priority given to all known flood hazard areas and areas of projected development or proposed construction through June 1990. The scope and methods of study were proposed to and agreed upon by FEMA and Oldham County.

2.2 Community Description

Oldham County covers 183.6 square miles of the north-central part of Kentucky. It is surrounded by Trimble County, Kentucky, on the north, Henry County and Shelby County, Kentucky, on the east, Jefferson County, Kentucky, on the south, and Clark County, Indiana, on the west. The county is served primarily by Interstate 71 and the Seaboard Coast Line Railroad. The 1980 population of Oldham County was reported to be 27,795 (Reference 1).

Oldham County was formed in 1832 from territory taken from Jefferson, Shelby, and Henry Counties. It was named for Colonel William Oldham, a native Virginian who was an officer in the Revolutionary War.

The City of LaGrange, the county seat, was named for the French estate of General Lafayette. It was formerly called Lick Branch, but was renamed LaGrange and incorporated in 1840. The first county seat of Oldham County was at Westport, which is on the Ohio River. In the steamboat era, the town became a thriving Ohio River port for shipping farm produce and receiving merchandise from the west. Ballardsville was at the center of north-south and east-west stagecoach lines.

The county is in the Bluegrass Land Resource Area (Reference 2). The Ohio River has cut a deep gorge along the northwestern boundary and serves as a county line with Clark County, Indiana. Metropolitan Louisville and Jefferson County adjoin Oldham County on the southwest. The northeastern portion of the county is dissected by Eighteen Mile Creek, Pattons Creek, and their tributaries. Floyds Fork, Harrods Creek, and their tributaries bisect the central and southern portions of the county from east to west. Elevation of the land ranges from about 430 feet along the Ohio River up to about 900 feet in the northwest sector of the county.

Based on records through 1974, the Louisville, Kentucky, and West Bureau and Anchorage, Kentucky, gages have reported average rainfall of 42.0 and 44.0 inches (Reference 3), respectively, with yearly totals ranging from 23.9 to 23.4 inches, respectively, in dry years, to 59.4 and 70.9 inches, respectively, in extremely wet years. Mean annual temperatures are 56.4 degrees Fahrenheit (°F) at Louisville and 55.0 °F at Anchorage. Recorded extremes are 107 °F and -20 °F.

2.3 Principal Flood Problems

At present, the principal flood problem in Oldham County is comprised of the floodplain of the Ohio River. The majority of damageable development in this floodplain is concentrated near the downstream edge of the county and the community of Westport. The downstream development is a result of close proximity to the Louisville Metropolitan area.

Major Ohio River floods of the century occurred in 1937, 1945, and 1964. The 1937 flood is believed to be the highest since settlement of the area. That flood reached an elevation of 458.6 feet National Geodetic Vertical Datum of 1929 (NGVD) at the Louisville gage and has an expected frequency in excess of once in 500 years. The 1945 and 1964 floods have estimated average recurrence intervals of once in 80 years and 65 years, respectively.

Figures 2 through 7 illustrate the projected flood elevations at six locations along the Ohio River.

2.4 Flood Protection Measures

Flood protection measures are not known to exist within the study area.

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude that are expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10-, 2-, 1-, and 0.2-percent chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long-term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood that equals or exceeds the 100-year flood (1-percent chance of annual exceedence) in any 50-year period is approximately 40 percent (4 in 10), and, for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

Figure 2 - The 100- and 500-year flood elevations of the Ohio River in front of residence at 2704 Belknap Drive.

BEST COPY AVAILABLE

BEST COPY AVAILABLE

Figure 3 - At Oldham Acres Road bridge over Little Huckleberry Creek, the 100-year flood elevation of the Ohio River would be approximately 7 feet above top of rod.

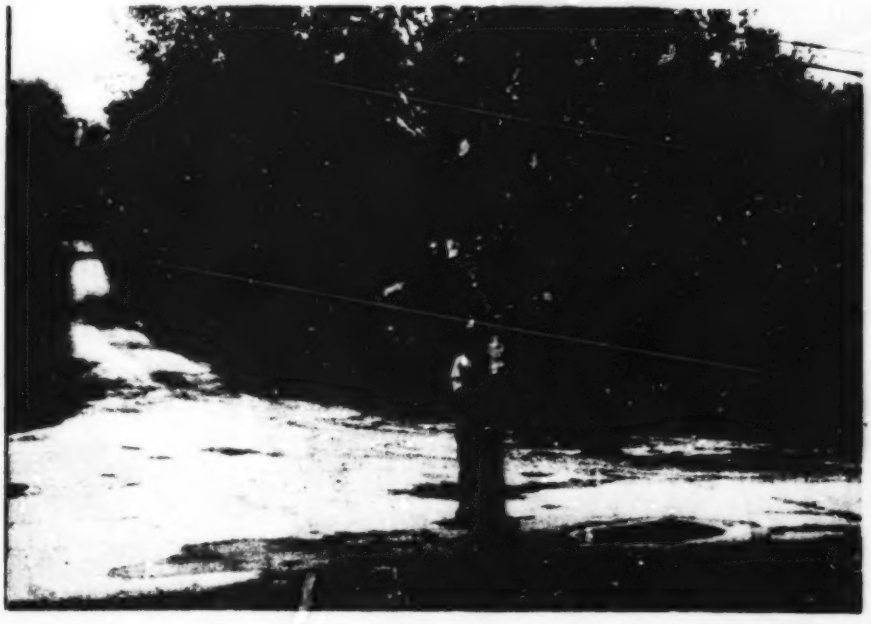


Figure 4 - On Riverside Drive, about 2,200 feet north of intersection of Riverside Drive and Oldham Acres Road, the 100-year flood elevation of the Ohio River would be approximately 3 feet above top of rod.

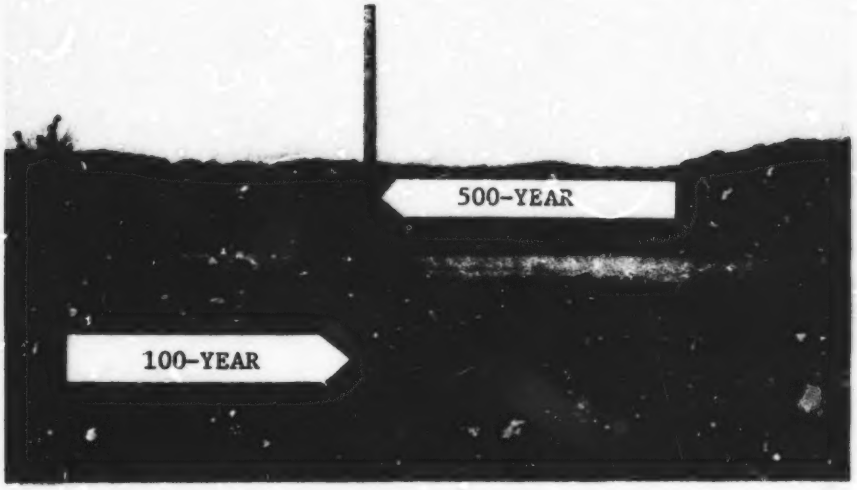


Figure 5 - The 100- and 500-year flood elevations of the Ohio River at the intersection of Cardinal Harbour Drive and Lakewoods Court.

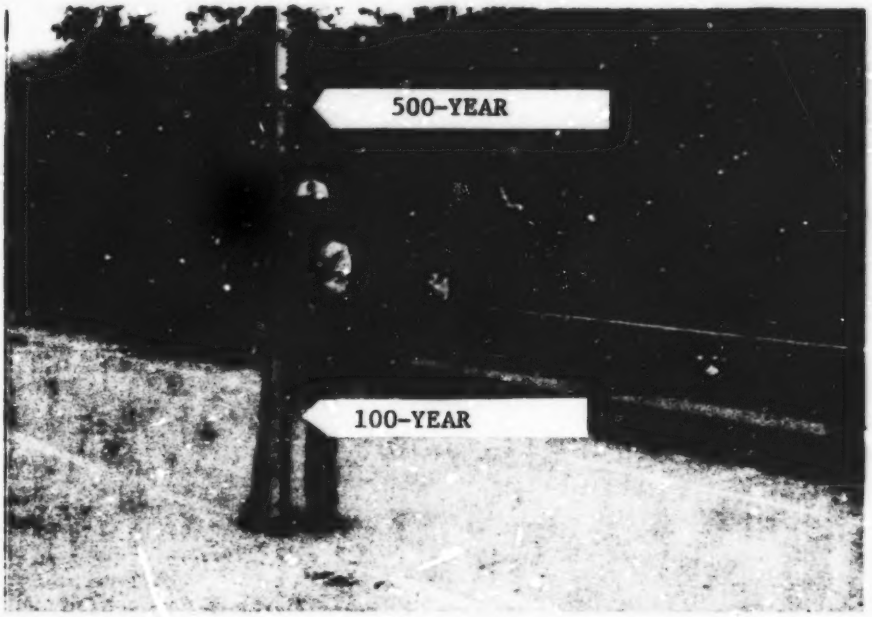


Figure 6 - The 100- and 500-year flood elevations of the Ohio River at State Route 524 bridge over Covington Ridge Branch.

BEST COPY AVAILABLE

Figure 7 - The 100-year flood elevations of the Ohio River at south bend in Old State Route 524.

BEST COPY AVAILABLE

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for each riverine flooding source studied in detail affecting the community.

Natural discharge-frequency curves on the Ohio River were developed in accordance with methods presented in "Statistical Methods in Hydrology" (Reference 4). Modified discharge-frequency curves on the Ohio River resulted from routing 12 representative floods for the Ohio River modified by an upstream reservoir system. That system included reservoirs completed or near completion in 1976. Data were plotted opposite original flood data on a grid containing a referenced (1965) flow reduction of natural flow and a new best-fit curve was drawn. Total reductions were read from the new curve at selected natural flow frequencies, and subtracted from natural flows at those frequencies to obtain new modified-flow values.

Peak discharge-drainage area relationships for the 10-, 50-, 100-, and 500-year floods of each flooding source studied in detail in the community are shown in Table 1.

TABLE 1 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (SQ MILES)	PEAK DISCHARGE (CFS) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
OHIO RIVER at Louisville gage (15 miles downstream of southwest county boundary)	91,170	600,000	750,000	812,000	950,000

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals.

Water-surface elevations of floods of the selected recurrence intervals were determined through use of the HEC-2 computer program (Reference 5).

Cross sections for the Ohio River were determined from detailed mapping developed for the Ohio River navigation studies (References 6 and 7). Ohio River stream mileages as depicted in this report are "Official Stream Mileages" as agreed upon between Federal, state, and local agencies with jurisdiction within the study area. Therefore, measurable map distances between consecutive mile points may not scale exactly.

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles. For stream segments for which a floodway was computed (Section 4.2), selected cross-section locations are also shown on the Flood Insurance Rate Map.

Channel roughness factors (Manning's "n") were assigned on the basis of field inspections of channel and floodplain areas. These values were verified by reproducing known high-water profiles with the HEC-2 computer program. An "n" value of 0.030 was used for the stream channel and 0.044 for the overbank.

Starting elevations on the Ohio River were developed by the slope-area method at the Oldham-Jefferson county line.

The water-surface elevations for the 100-year recurrence interval for all remaining streams studied by approximate methods were computed using Manning's Formula. Cross sections were based on map and field reconnaissance, but were not field surveyed. Bridge and culvert data were obtained only when there was an indication that a significant backwater effect would result. These bridges were hand-measured but not field surveyed. Slope for Manning's Formula was based on the streambed profiles obtained from topographic mapping.

The 100-year elevation data on all streams studied by approximate methods were based on slope-area computations, or the 100-year backwater elevation from the receiving stream, whichever controlled.

Flood profiles were drawn showing the computed water-surface elevations for floods of the selected recurrence intervals. In cases where the 50- and 100-year flood elevations are close together, due to limitations of the profile scale, only the 100-year profile has been shown.

The hydraulic analyses for this study are based only on the effects of unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

All elevations are referenced to the NGVD. Elevation reference marks used in this study are shown on the map and described in the exhibit labeled Elevation Reference Marks.

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The National Flood Insurance Program encourages state and local governments to adopt sound floodplain management programs. Therefore, each Flood Insurance Study provides 100-year flood elevations and delineations of the 100- and 500-year floodplain boundaries and 100-year floodway to assist communities in developing floodplain management measures.

4.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1-percent annual chance (100-year) flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2-percent annual chance (500-year) flood is employed to indicate additional areas of flood risk in the community. For each stream studied in detail, the 100- and 500-year floodplain boundaries have been delineated using the flood elevations determined at each cross section. Between cross sections, the boundaries

were interpolated using topographic maps at a scale of 1:3600 with a contour interval of 5 feet (Reference 6).

The 100- and 500-year floodplain boundaries are shown on the Flood Insurance Rate Map. On this map, the 100-year floodplain boundary corresponds to the boundary of the areas of special flood hazards (Zones A, AE, AH, AO, A99, V, and VE) and the 500-year floodplain boundary corresponds to the boundary of areas of moderate flood hazards. In cases where the 100- and 500-year floodplain boundaries are close together, only the 100-year floodplain boundary has been shown. Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

For the streams studied by approximate methods, only the 100-year floodplain boundary was delineated using topographic maps at a scale of 1:24000 with a contour interval of 10 feet (Reference 7).

4.2 Floodways

Encroachment on floodplains, such as structures and fill, reduces the flood-carrying capacity, increases the flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard. For purposes of the National Flood Insurance Program, a floodway is used as a tool to assist local communities in this aspect of floodplain management. Under this concept, the area of the 100-year floodplain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 100-year flood can be carried without substantial increases in flood heights. Minimum Federal standards limit such increases to 1.0 foot, provided that hazardous velocities are not produced. The floodways in this study are presented to local agencies as minimum standards that can be adopted directly or that can be used as a basis for additional floodway studies.

The floodways presented in this study were computed for certain stream segments on the basis of equal conveyance reduction from each side of the floodplain. Floodway widths were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. The results of the floodway computations are tabulated for selected cross sections and are shown in Table 2, Floodway Data. The computed floodways are shown on the Flood Insurance Rate Map. In cases where the floodway and the 100-year floodplain boundaries are either close together or collinear, only the floodway boundary is shown. Portions of the floodway for the Ohio River lie outside the county boundary.

The area between the floodway and the 100-year floodplain boundaries is termed the floodway fringe. The floodway fringe encompasses the portion of the floodplain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood by more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 8.

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH[2] (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET)
OHIO RIVER								
A	592.5	4105	179,179	4.5	453.1	453.1	454.1	1.0
B	592.0	3840	203,184	4.0	453.2	453.2	454.2	1.0
C	591.5	3235	170,443	4.8	453.2	453.2	454.2	1.0
D	591.0	2660	148,235	5.5	453.3	453.3	454.3	1.0
E	590.5	2275	135,772	6.0	453.3	453.3	454.3	1.0
F	590.0	2043	127,500	6.4	453.4	453.4	454.4	1.0
G	589.5	2370	138,625	5.9	453.6	453.6	454.6	1.0
H	589.0	2515	142,268	5.7	453.7	453.7	454.7	1.0
I	588.5	1972	126,389	6.4	453.8	453.8	454.8	1.0
J	588.0	2458	143,464	5.7	454.1	454.1	455.1	1.0
K	587.5	2350	139,224	5.8	454.2	454.2	455.2	1.0
L	587.0	2429	143,418	5.7	454.3	454.3	455.3	1.0
M	586.5	2725	153,350	5.3	454.5	454.5	455.5	1.0
N	586.0	3010	157,132	5.2	454.6	454.6	455.6	1.0
O	585.5	3015	154,269	5.3	454.7	454.7	455.7	1.0
P	585.0	2655	146,385	5.5	454.8	454.8	455.8	1.0
Q	584.5	2510	135,199	6.0	454.9	454.9	455.9	1.0
R	584.0	2030	123,925	6.6	455.0	455.0	456.0	1.0
S	583.5	2190	133,094	6.1	455.2	455.2	456.2	1.0
T	583.0	2885	158,087	5.1	455.5	455.5	456.5	1.0
U	582.5	3485	165,213	4.9	455.6	455.6	456.6	1.0
V	582.0	3940	166,524	4.9	455.8	455.8	456.8	1.0
W	581.5	2895	153,122	5.3	455.9	455.9	456.9	1.0
X	581.0	2500	140,718	5.8	455.9	455.9	456.9	1.0
Y	580.5	2135	130,309	6.2	456.0	456.0	457.0	1.0
Z	580.0	1825	115,647	7.0	456.0	456.0	457.0	1.0

[1]MILES BELOW HEADWATERS AT PITTSBURGH
[2]THIS WIDTH EXTENDS BEYOND COUNTY BOUNDARY

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

OLDHAM COUNTY, KY
(UNINCORPORATED AREAS)

FLOODWAY DATA

OHIO RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH[2] (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET)
OHIO RIVER								
AA	579.5	2095	123,800	6.6	456.3	456.3	457.3	1.0
AB	579.0	2310	133,187	6.1	456.6	456.6	457.6	1.0
AC	578.5	2440	134,869	6.0	456.8	456.8	457.7	0.9
AD	578.0	2435	138,275	5.9	456.9	456.9	457.9	1.0
AE	577.5	2040	124,450	6.5	456.9	456.9	457.9	1.0
AF	577.0	2155	124,994	6.5	457.2	457.2	458.2	1.0
AG	576.5	2205	128,740	6.3	457.3	457.3	458.3	1.0

[1]MILES BELOW HEADWATERS AT PITTSBURGH
[2]THIS WIDTH EXTENDS BEYOND COUNTY BOUNDARY

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

OLDHAM COUNTY, KY
(UNINCORPORATED AREAS)

FLOODWAY DATA

OHIO RIVER

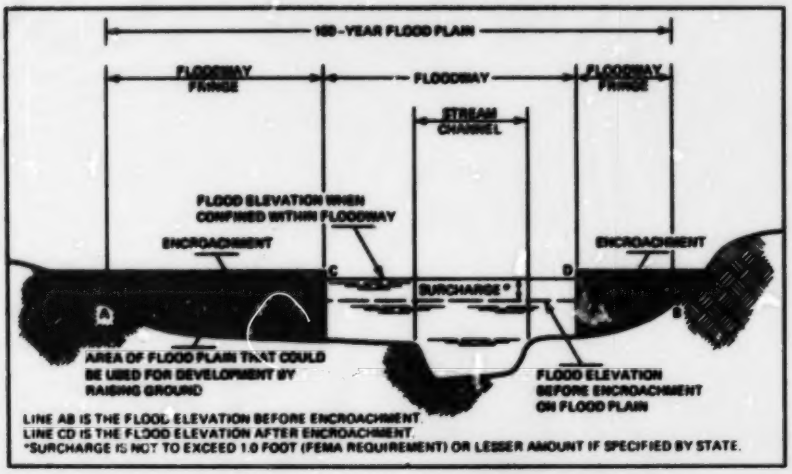

100-YEAR FLOOD PLAIN
FLOODWAY FRINGE
FLOODWAY
FLOODWAY FRINGE
STREAM CHANNEL
FLOOD ELEVATION WHEN CONFINED WITHIN FLOODWAY
ENCROACHMENT
ENCROACHMENT
C
D
SURCHARGE *
A
B
AREA OF FLOOD PLAIN THAT COULD BE USED FOR DEVELOPMENT BY RAISING GROUND
FLOOD ELEVATION BEFORE ENCROACHMENT ON FLOOD PLAIN
LINE AB IS THE FLOOD ELEVATION BEFORE ENCROACHMENT
LINE CD IS THE FLOOD ELEVATION AFTER ENCROACHMENT
*SURCHARGE IS NOT TO EXCEED 1.0 FOOT (FEMA REQUIREMENT) OR LESSER AMOUNT IF SPECIFIED BY STATE.

FIGURE 8 - Floodway Schematic

5.0 INSURANCE APPLICATION

For flood insurance rating purposes, flood insurance zone designations are assigned to a community based on the results of the engineering analyses. These zones are as follows:

Zone A

Zone A is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no base flood elevations or depths are shown within this zone.

Zone AE

Zone AE is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by detailed methods. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone X

Zone X is the flood insurance rate zone that corresponds to areas outside the 500-year floodplain, areas within the 500-year floodplain, areas of 100-year flooding where average depths are less than 1 foot, areas of 100-year flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 100-year flood by levees. No base flood elevations or depths are shown within this zone.

6.0 FLOOD INSURANCE RATE MAP

The Flood Insurance Rate Map is designed for flood insurance and floodplain management applications.

For flood insurance applications, the map designates flood insurance rate zones as described in Section 5.0 and, in the 100-year floodplains that were studied by detailed methods, shows selected whole-foot base flood elevations or average depths. Insurance agents use the zones and base flood elevations in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

For floodplain management applications, the map shows by tints, screens, and symbols the 100- and 500-year floodplains, the floodways, and the locations of selected cross sections used in the hydraulic analyses and floodway computations.

7.0 OTHER STUDIES

The Flood Insurance Studies for the Unincorporated Areas of Henry County and Jefferson County, Kentucky (References 8 and 9) and the Unincorporated Areas of Clark County, Indiana (Reference 10) are in agreement with this study.

Due to its more detailed analysis, this Flood Insurance Study supersedes the previously printed Flood Hazard Boundary Map for Oldham County (Reference 11).

8.0 LOCATION OF DATA

Information concerning the pertinent data used in the preparation of this study can be obtained by contacting the Natural and Technological Hazards Division, FEMA, 1371 Peachtree Street, NE., Suite 736, Atlanta, Georgia 30309.

9.0 REFERENCES AND BIBLIOGRAPHY

1. U.S. Department of Commerce, Bureau of the Census, 1980 Census of Population, Number of Inhabitants, Kentucky, Washington, D.C., February 1982.

2. Austin, Morris E., "Land Resource Regions and Major Land Resource Areas of the United States," U.S. Department of Agriculture Handbook 296, 1965.

3. U.S. Department of Commerce, Weather Bureau, Technical Paper No. 40, Rainfall Frequency Atlas of the United States, Washington, D.C., January 1963.

4. U.S. Army Corps of Engineers, Statistical Methods in Hydrology, Leo R. Beard, January 1962.

5. ————, Hydrologic Engineering Center, HEC-2 Water-Surface Profiles. Generalized Computer Program, Davis, California, April 1984.

6. ————, Ohio River Flood Plain, McAlpine Pool Reach Maps, Scale 1:3600, Contour Interval 5 feet, Sandy Hood Datum: Sheets 10SE, 10NE, 11SW, 11SE, 11NE, 12SW, 12SE, 13SW, 13SE, 13NE, 14SW, 14SE, 14NW, 14NE, 15SE, 16SW, 16SE.

7. U.S. Department of the Interior, Geological Survey, 7.5-Minute Series Topographic Maps, Scale 1:24000, Contour Interval 10 feet: Anchorage, Kentucky, 1981; Ballardsville, Kentucky, 1961; Bedford, Kentucky, 1953; Bethlehem, Indiana-Kentucky, 1953; Crestwood, Kentucky, 1981; LaGrange, Kentucky-Indiana, 1969; Owen, Indiana, 1961; Smithville, Kentucky, 1969.

8. Federal Emergency Management Agency, Flood Insurance Study, Henry County, Unincorporated Areas, Kentucky, January 1986.

9. ————, Flood Insurance Study, Jefferson County, Unincorporated Areas, Kentucky, November 1982.

10. ————, Flood Insurance Study, Clark County, Unincorporated Areas, Indiana, February 1983.

11. U.S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Hazard Boundary Map, Oldham County, Unincorporated Areas, Kentucky, July 1977.

U.S. Army Corps of Engineers, Hydrologic Engineering Center, HEC-1 Flood Hydrograph Package, Davis, California, revised September 1981.

ELEVATION REFERENCE MARKS

REFERENCE MARK	FLOOD INSURANCE RATE MAP PANEL	ELEVATION (FEET NGVD)	DESCRIPTION OF LOCATION
1	0065	445.44	standard disk set in concrete flush with ground located 8.86 feet east of centerline of Belknap Beach Road approximately 1,650 feet south of T-intersection
2	0065	446.08	standard disk set in concrete flush with ground located 9.62 feet west of centerline of Belknap Beach Road approximately 1,360 feet south of T-intersection
3	0065	463.81	U.S. Coast and Geodetic Survey standard disk stamped "Y350 1954" set in top of concrete post located 28 feet west of centerline of Rose Island Road approximately 820 feet south of intersection with River Bluff Road
4	0065	454.15	U.S. Coast and Geodetic Survey standard disk stamped "Z350 1954" set in top of concrete post located 20 feet east of centerline of Rose Island Road approximately 1,850 feet south of intersection with Oldham Road
5	0065	481.60	U.S. Coast and Geodetic Survey standard disk stamped "A351 1954" set in top of a concrete post projecting 4 inches from ground located 22 feet east and 37 feet north of intersection of Mayo Lane and Rose Island Road
6	0065	471.06	Station TTA-21 set in concrete post flush with ground located 230 feet south of centerline of Riverside Drive and 12.51 feet west of centerline of private drive approximately 2,000 feet west of intersection with Rose Island Road
7	0080	455.51	U.S. Coast and Geodetic Survey standard disk stamped "M351 1954" set in top of concrete post located 32 feet southwest of the centerline of Westport Road approximately 0.5 mile southeast of intersection with Eighteen Mile Creek Road
8	0080	454.32	U.S. Coast and Geodetic Survey standard disk stamped "P351 1954" set in top of concrete post located 27 feet southeast of centerline of Covington Ridge Road approximately 0.83 mile north of its intersection with Main Street

ELEVATION REFERENCE MARKS (cont'd)

REFERENCE MARK	FLOOD INSURANCE RATE MAP PANEL	ELEVATION (FEET NGVD)	DESCRIPTION OF LOCATION
9	0015	436.88	U.S. Coast and Geodetic Survey standard disk stamped "Q351 1954" set in southwest end of concrete culvert under road located 25 feet southeast of centerline of Covington Ridge Road approximately 1.65 miles north of its intersection with Westport Road
10	0015	461.94	U.S. Coast and Geodetic Survey standard disk stamped "P351 1954" set in top of concrete post located 66 feet north of centerline of Covington Ridge Road approximately 2.1 miles north of its intersection with Westport Road

BLANK PAGE

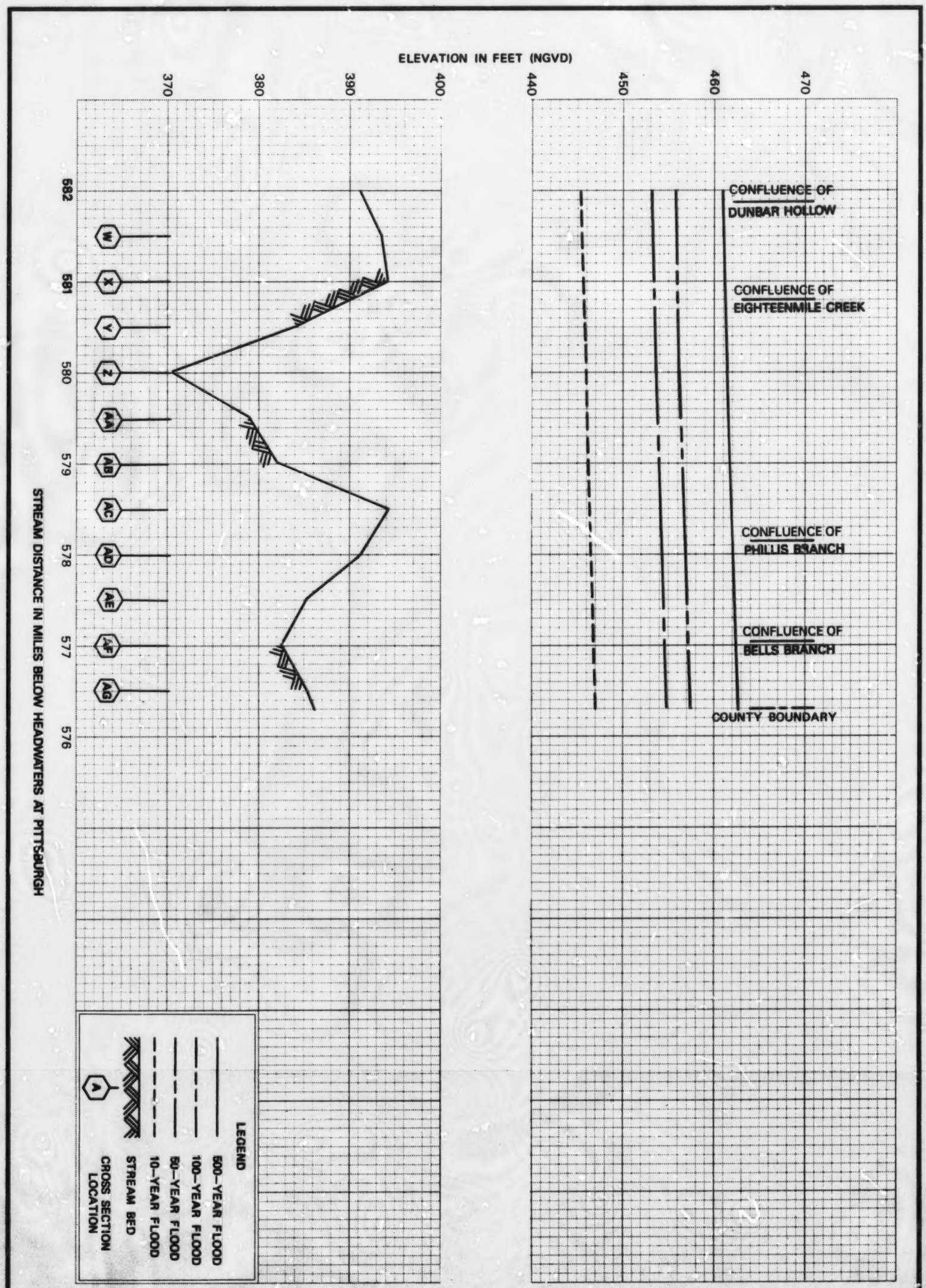
FLOOD PROFILES

OHIO RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

OLDHAM COUNTY, KY
(UNINCORPORATED AREAS)

01P



FEDERAL EMERGENCY MANAGEMENT AGENCY

OLDHAM COUNTY, KY

(UNINCORPORATED AREAS)

FLOOD PROFILES

OHIO RIVER

02P